1. Introduction

Complex products and systems (CoPS) are high value, high technology and engineering-intensive products (e.g. aircrafts, high-speed trains), systems (e.g. telecom network, ecosystems), service (large ERP, software projects), and infrastructure assets (airports, intelligent buildings). Prior research investigates how suppliers of CoPS transition to the provision of services in combination with products as integrated solutions to requirements and needs of large industrial and government customers (Davies, 2004; Davies, Brady, & Hobday, 2007; Davies, Brady, & Hobday, 2006; Hobday, Davies, & Prencipe, 2005; Kowalkowski, Windahl, Kindstroem, & Gebauer, 2015; Lee & Yoon, 2015; Vaccaro, Jansen, Van den Bosch, & Volderda, 2012). Extant research on integrated solutions tends to focus on either the supplier (Gann & Salter, 2000) or buyer organizations (Kapletia & Probert, 2009). Little or no research, however, has studied how buyers and suppliers work together in new innovative arrangements. Our study responds to this gap in the literature by studying how the provision of integrated solutions depends on a complementary management innovation based on co-located collaborative "integrated project teams" involving members of the supplier and buyer organizations.

Our study focuses on a management innovation new to an organization (Walker, Damanpour, & Devece, 2010) which was jointly developed by a consultancy (contractor) and client organization in a CoPS setting. Management innovation refers to the adoption and implementation of a management practice, process, structure, or technique that is either new to the state of the art or new to the organization (Mol & Birkinshaw, 2009). The evolving dyadic inter-organizational relationship is the context for the joint development of a management innovation (Batt & Purchase, 2004; Lacoste, 2016). A deeper understanding of this process in CoPS leads to an accumulation of theoretical and practical knowledge about organizations, and allows scholars to advise organizations to create innovations that may benefit a variety of stakeholders (Hamel, 2006). There are few

empirical studies investigating the process of management innovation and how it unfolds over time. In addition, extant management innovation literature focuses mainly on the intra-organizational level of analysis, thus neglecting the importance of inter-organizational relationships - important for CoPS - in stimulating management innovation. We remedy these gaps by studying the adoption and dynamics of management innovation in a CoPS setting by two collaborating organizations over time. Thus, the study addresses the following research question: *How do different organizational structures change over time to support the process of management innovation in an inter-organizational relationship in a CoPS setting?* We adopt a longitudinal research approach to investigate the patterns underlying these changes (Van de Ven & Poole, 2005) in order to offer an understanding of the dynamics and context within which client and consultant co-innovate in CoPS.

The paper contributes to both theory and practice. First, the analysis shows that inter-organizational relationships in CoPS are vital to the development and implementation of a management innovation. The process can be characterized by four distinct, yet inter-related, phases: motivation, search, adaptation, as well as implementation and validation. Findings stress that in order to move from the search to the adaptation phase for a management innovation in CoPS, both partnering organizations needed to build up a working relationship. Our analysis is driven by calls for longitudinal and empirical investigations with regards to management innovation and CoPS research (e.g. Aarikka-Stenroos, Jaakkola, Harrison, & Mäkitalo-Keinonen, 2017; Ethiraj & Vevinthal, 2004). Also, our study focuses on the co-innovation process in a dyadic relationship setting, offering yet underexplored insights on a collaborative relationship realizing a management innovation (Battilana & Casciaro, 2012; Dawson, Young, Tu, & Chongyi, 2014; Volberda, Van den Bosch, & Mihalache, 2014).

Second, the study shows the development of IPT as a management innovation in a dyadic relationship setting was supported by both internal and external change agents. These findings

extend prior studies by illustrating that both agents jointly lending credibility to the management innovation process (Volberda et al., 2014). Third, this study also contributes to extant literature on integrated project team (IPT) structures. IPT represents a distinct form of organizing, going beyond traditional arms-length relationships with knowledge exchange, but also offers a "laboratory" where further innovation is initiated (Miles, 2008). Findings show that IPT is based on four essential characteristics: (i) cross-functional integration; (ii) co-location; (iii) relational contracting; and (iv) strategic, program-level activities.

The paper has six sections. Following the introduction, section 2 reviews the key literature and section 3 presents our methods and data. A description of the dynamics, structures, and processes of management innovation and IPT is offered in section 4. Section 5 discusses the key theoretical and managerial implications, and draws out research limitations. Finally, section 6 concludes the study.

2. Theoretical Background

As an overall conceptual research model our study is primarily based on a knowledge-based approach (Grant, 1996) and supplemented by the literature on organizational design (Galbraith, 1995). We use these perspectives to discuss, how two organizations work jointly together to develop a new organizational form, a management innovation, over time.

2.1 Moving towards product-service integration

The last decades witnessed a shift for companies to offer services related to their products (Vandemerwe & Rada, 1988; Jacob & Ulaga, 2008). Firms offer customer-centric packages or "bundles" of goods, services, support, and knowledge to add value to core offerings. Various terms are used to describe this shift such as "servitization" (Vandemerwe & Rada, 1988), 'service-

dominant logic' (Vargo & Lusch, 2004), and "integrated solutions" (Davies, 2004). Organizations following this strategy seek to: (i) increase customer demand and lock-in situations, (ii) realize further growth, increased profits and stability, and (iii) rationalize scarce resources (Ploetner, 2008; Wise & Baumgartner, 1999). For example, the aero-engine manufacturer Rolls Royce does not sell just aircraft engines, but earns an increasing share of its revenues from providing "total care" solutions through the "power by the hour" concept.

Research shows that large revenues are derived from an installed base of products with a long life-cycle (Potts, 1988), but services lead to higher and more stable profit margins than products (Anderson, Fornell, & Roland, 1997; Roehrich & Caldwell, 2012). The emergence of integrated solution offerings in CoPS industries occurred when firms developed new business models to secure sustained revenues through the provision of services in combination with physical products and systems (Davies, 2004; Davies & Brady, 2000). The transition to solutions provision is well documented (Cova & Salle, 2008). In the early 1990s, the idea of solutions provision appeared mainly based on sectors delivering complex products and systems (Hobday, 2000) and BOT (build-operate-transfer) infrastructure projects (Brady, Davies, & Gann, 2005). Solution clients are not simply concerned with the value obtained from the physical product, but "look for solutions that serve their own value-generating processes" (Grönroos, 2000: 4). The ability continuously to create value is a central theme in the strategy and (industrial) marketing literature (Grönroos & Voima, 2013; Matthyssens & Vandenbempt, 2008; Ulaga, 2001). Thus, providers of integrated solutions aim to create sustainable competitive advantage for clients (Lindgreen & Wynstra, 2005) by addressing the challenges of life-cycle management, including maintenance, increasing reliability, and inter-operability (Davies et al., 2006, 2007).

The integrated solutions literature has its roots in the so-called "system selling" or "systems marketing" literature, as pioneered by the industrial marketing literature, and dates back to the 1960s

(Hannaford, 1976; Mattson, 1973). System selling is defined as the provision of products and services as integrated systems that provide solutions to client's operational needs (Page & Siemplenski, 1983). Later industrial marketing management research identified the move from "system selling" to "solution selling" by adopting a wider perspective encompassing the complete activity of the client, arguing for a role change from a seller of products or services to a strategic consultant able to assist the client's value creation processes (Cova & Salle, 2007; Jacob & Ulaga, 2008). Saul and Gebauer (2018) researched dynamic capabilities that enable product companies to become solution providers. They found that routines for sensing internal and external opportunities, seizing standardization and customizations, and individual skills enabling these options play an important role in the process.

In their study of different forms of solutions provision, Davies et al. (2007) argue that the type of organization adopted is linked to the customer's make or buy decision. The customer can purchase the whole system from a vendor, develop it internally, or create some combination of both. Extant literature focuses primarily on either the seller-centric perspective (Davies, 2004; Davies & Brady, 2000) or the customer-centric perspective (e.g. Kapletia & Probert, 2009; Petri & Jacob, 2016). Similarly, Howard and Caldwell (2011) draw attention to the complexities involved in procuring complex performance, involving complex products and services, across the lifecycle. However, few studies investigate in-depth the interactive processes unfolding over time between buyer and supplier seeking to drive co-innovation in CoPS delivery.

Adopting a buyers- or supplier-centric perspective offers an "artificial divide". For example, the literature on services argues that the ongoing innovation, production, and consumption of services take place in continuous interaction between organizations (Van der Valk, 2008; Zeithaml & Bitner, 1996). The close connection between products and services offers the opportunity for generating new approaches to organizational structure between companies (Antonacopoulou &

Konstantinou, 2008). Hence, there is a need for further research to investigate forms of relationship integration and associated implications for organizational structures that exist in these complex systems environments (Brusoni, Prencipe, & Pavitt, 2001; Kapletia & Probert, 2009; Penttinen & Palmer, 2007).

2.2 Dyadic interactions in a CoPS setting

A dyadic relationship perspective on organizational structures is important when considering the interactions between buyer and seller over time (Dyer & Singh, 1998) from requirement definitions, to customization, to operating, and delivering maintenance services to post-deployment support and after-sales service, such as maintenance services, lasting throughout the period of product ownership and extended life-cycles (Cohen & Whang, 1997). Tuli, Kohil and Bharadwaj's (2007) study draws out how solution effectiveness is not just relying on how the supplier configures the solution and its organization, but also on a set of buyer and supplier variables and the relationship between both organizations. A dyadic relationship perspective for delivering integrated solutions and, jointly developing innovation supports the sharing of information in a more open, consultative, and informal way, thus partnering organizations entering in a close and ongoing dialogue (Bouncken, Clauß, & Fredrich, 2016; Brady et al., 2005; Cornet et al., 2000). An increased frequency of both information and economic transactions between the buyer and the supplier therefore often leads to the need to forge long-term, collaborative relationships underpinned by trust (Håkansson, 1982).

According to prior studies (e.g. Bossink, 2002; Dawson et al., 2014; Lee, Olson, & Trimi, 2012), the capability of organizations to co-innovate is important for sustaining and strengthening competitive advantage. By sharing resources, knowledge, and competencies, together organizations create new products, processes, and organizational structures. Bossink (2002) argues that innovation champions and leaders are the driving forces for co-innovation and strategy development. Similarly,

Cova and Salle (2008) argue that value in integrated solutions is realized through co-developing activities between the supplier and the customer. Other relevant studies include Lee et al. (2012) who adopted a macro-view on the evolution of innovation from closed to collaborative co-innovation. Lee et al. (2012: 817) broadly define co-innovation as "a new paradigm where new ideas and approaches from various internal and external sources are integrated."

Our study focuses on a specific type of collaboration; the buyer-supplier interface between a client and contractor (in our study a technical consultancy firm). This relationship between a firm and a professional service firm (von Nordenflycht, 2010) constitutes a knowledge-intensive interface within CoPS delivery that differs from more traditional buyer-supplier relationships as found, for example, in manufacturing industries (Teece, 2003). This is because of the high level of knowledge asymmetry between client and consultant (Barthélemy, 2016). Private and public sector organizations alike have outsourced complex, knowledge-intensive services such as HRM, R&D, or critical IT. While the strategic rationale for this decision remains efficiency optimization, a number of other factors, including specialization of core competencies, and greater technological complexity, should be considered (Balakrishnan, Mohan, & Seshadri, 2008; Spring & Araujo, 2009) as having shifted the scale and scope of outsourcing and the drive for inter-organizational structures. Inter-organizational relationships in CoPS are important (Gruber, Harhoff, & Hoisl, 2013), and Grant and Baden-Fuller (2004) specify that such collaborations are often organized to access rather than acquire knowledge. Knowledge accessing may lead to further increase of collaboration that demand not only an organizational design to govern this inter-organizational relationship (Bettencourt, Ostrom, Brown, & Roundtree, 2002; Damanpour, 1991), but also provide grounds for the emergence and adoption of management innovations. This study explores the dynamics of two organizations jointly developing a management innovation (Romero & Molina, 2011) in a CoPS setting.

2.3 IPT as a management innovation

The shift to services in offering integrated solutions in CoPS could not occur without supplementary management innovations in organizational design based on IPT to forge closer and more collaborative relationships. Management innovation refers to the adoption and implementation of a management practice, process, structure, or technique that is either new to the state of the art or new to the organization (Mol & Birkinshaw, 2009; Walker et al., 2010). Organizations may both generate and then apply a particular management innovation, but it is also common that a management innovation is generated by one organization and then is adopted by another (Damanpour & Wischnevsky, 2006). Examples of management innovations include total quality management (TQM) and just-in-time (JIT) approaches.

Following the conceptualization by Walker et al. (2010), this study defines "newness" relative to the adopting organization. This distinction is appropriate because the study focuses on the creation and adoption of a management innovation and its intent to further organizational goals. While this management innovation may not be a radical innovation, it may have a substantial impact on organizations delivering integrated solutions in a CoPS setting. In other words, our focus is on innovation in management practices, processes, and structures, which affect the day-to-day work at operational and strategic levels in a CoPS setting (Mol & Birkinshaw, 2009). Management innovation seeks to generate positive outcomes for the innovating firm, project and/or society as a whole. Therefore, management innovation can be a vital part "in the process of changing organizations, facilitating organizational adaptation to the external environment and increasing the efficiency and effectiveness of internal processes" (Walker et al., 2010: 370). Management innovation is vital to ensure the shift to services in offering integrated solutions.

We share the conception, based on the work of Zbaracki (1998) and Birkinshaw, Hamel and Mol (2008) that the management innovation process proceeds through different phases in an evolutionary process. While the phases of the process have been studied for management innovation which are new to the-state-of-the-art (following (i) motivation, (ii) invention, (iii) implementation, (iv) theorization and labelling), the process is under-researched for management innovations, which are jointly developed in an inter-organizational relationship. These phases are supported by actions of internal (to the innovating organization such as proactive employees) and external (such as consultants and academics) change agents and further shaped by the organizational and environmental context (Mol & Birkinshaw, 2014).

Research identifies different forms of management innovation and specifies various roles of internal and external change agents in this process. For instance, managers may actively search for new knowledge on management practices (Tidd, Bessant, & Pavitt, 2005; Van de Ven, 1986). Internal change agents can bring in external experience (Hoang & Rothaermel, 2009) through, for instance, prior jobs in different industries or through external training. Both change agents may also source external knowledge; the observation of related practices in other contexts that are transferred into the focal organization. External knowledge sourcing is a well-known means of innovating in technology and product domains (Leiponen & Helfat, 2010) and has been argued to affect management innovation too, a view that is yet to be supported by longitudinal evidence (Ganter & Hecker, 2011).

Management innovation involves an ideation (typically adopted from a different context) about what may work and the implementation of that ideation (Tidd et al., 2005). Our study considers IPT as an innovation in management structure and practice (Fleming & Koppelman, 1996). Specialized knowledge and expertise found in partnering organizations are brought together – or integrated – in a cross-functional team with the authority to lead and execute projects (Huang &

Newell, 2003). It is difficult to identify the first introduction of IPT as a novel managerial practice, but the oil and gas industry certainly played a pioneering role in defining and implementing early forms of IPT in major offshore projects during the 1980s. Some form of IPT structure is recognized in early studies of R&D and new product development projects.

Integrated project teams were, for example, created to provide a leadership and authority structure for integrating the functional parts – specialized expertise and disciplines – into a unified whole to accomplish the project's goals (Allen, 1977). The key task of the project team is "not to do the work but to coordinate the decision process" (Galbraith, 1973: 93). Cross-functional integration of knowledge depends on the second element of project teams – the creation of a team comprised of different specialists to deal with common customers, clients, functions, regions, functions, processes, or products (Galbraith, 1973). The team structure depends on high levels of collaboration and trust to integrate different views, perspectives, and personalities (Davis & Lawrence, 1977). Distinctive and potentially divisive "thought worlds" associated with each contractor are overcome by combining different perspectives in multi-functional project teams in a highly interactive and iterative fashion (Dougherty, 1992, 2017). Teams are most effective when physically co-located to facilitate lateral communication and speed of decision making (Galbraith, 1973). For example, the approach used to deliver BP's Andrew oil field project in the North Sea contributed to the UK government's Cost Reduction in the New Era (CRINE) to promote inter-organizational cooperation (Barlow, 2000). BP's Andrew project was created as a single team to avoid unnecessary duplication of functions and authority. Members of the team shared the same office building and used integrated design and video links with manufacturing and assembly sites. It appears that IPT is gaining momentum, certainly in the UK and US it is becoming the standard for procuring and delivering public sector projects in defense, construction, aerospace and transport infrastructure. However, despite its growing prominence, IPT has received little systematic and empirical

investigation. IPT may pay a vital role in a CoPS setting by driving more collaborative inter-organizational relationships over time.

3. Data and methods

3.1 Research approach and setting

The study adopted a longitudinal research approach to identify the dynamic processes and structures of two organizations jointly developing a management innovation in a CoPS setting. Longitudinal studies unfold the temporal order, pattern, and sequence of events, explaining how and why they progress as they do by shaping a historical narrative (Langley, 1999; Van de Ven & Poole, 2005). We study in-depth the case of two firms, a water utility and engineering consultancy firm, working under increasingly close cooperation in the UK water industry over a 5-year period. While we collected data covering the period from 1990 to 2010, we specifically focus on the final period of 2005 to 2010 to investigate our key concepts in-depth within a CoPS setting. We identified a longitudinal study of a single case as the most appropriate approach for exploring the development of a management innovation in a long-term inter-organizational relationship in CoPS (Eisenhardt & Graebner, 2007; Meredith, 1998).

Our research question requires us to examine the identification, adoption, and development of a new organizational structure (in this case IPT) as a management innovation and focus on how two parties work together over time. This approach helps to grasp the complexity of the management innovation development process within and across organizations (Pettigrew, 1990), adopting a combination of retrospective and real-time analysis.

The case was selected because both parties involved are recognized as innovative in the UK water industry. The market in the UK water industry is partitioned into distinct five-year periods. This feature helped us to address the pervasive and critical issue of time in longitudinal research by

knowing more precisely when the process begins and ends (Pettigrew, 1990). We deploy a narrative strategy focusing on how managers make sense of innovation through stories in combination with temporal bracketing strategy, examining how actions of one period lead to changes in the context that will affect actions in subsequent periods (Langley, 1999).

We were granted access to a rich dataset that provided an opportunity to study how innovative ideas were identified, adapted and developed. Most of our fieldwork was conducted while the management innovation was a "live development", allowing us to capture real-time data on decisions, perceptions, expectations about the future course of events and retrospective interpretations of development outcomes. Due to the public nature of this inter-organizational relationship, the relationship attracted press coverage and intense public scrutiny, generating a large amount of secondary data that was helpful in identifying organizational challenges facing the developments.

3.2 Data sources and collection

Our research study focused on five years of the dyadic relationship to investigate the emerging relationship between a consultancy and water firm in realizing a management innovation. We conducted 34 face-to-face interviews which were then combined with documentary analysis (from an industry and project-based level), helping to build issue-organized chronologies of events related to management innovation over time (Langley, 1999). Our interview guide was structured around a set of detailed questions concerning areas such as, the evolving cooperation between parties, challenges, and benefits of co-innovating, the process leading to the management innovation – IPT, and joint solution provision. Interviewees were categorized into three groups: (i) individuals from multiple levels of the organizational hierarchy; (ii) individuals from different functional areas; and (iii) individuals present at different points in the relationship's history (see Appendix A). In order to

circumvent validity and reliability problems, we made use of a number of techniques that helped to overcome the bias introduced by the respondents' memory lapse and retrospective biases. These included: multiple respondents from different levels, functions, and at different points in time; triangulation of primary and secondary data sources; structured interview guide; case description checked by key informants (Gibbert, Ruigrok, & Wicki, 2008). Moreover, primary data were triangulated with secondary data such as company reports and PowerPoint presentations, Water Services Regulation Authority documentation, newspaper articles and trade press clippings to strengthen external validity. The point of "data-saturation" was reached as the research encountered diminishing returns from incremental interviews and the research questions were satisfactorily addressed (Glaser & Strauss, 1967).

3.3 Data analysis

In a first phase of data analysis, primary and secondary source material was coded by one of the authors. The findings were written up in a 45-page in-depth case study report, forming the basis for subsequent discussions with key informants to verify the accuracy of our findings. A second phase of data analysis, which included the recoding of all source material by another author was supported by the computer-aided program NVivo. To increase inter-coder reliability, the authors first coded interviews individually and then compared coding results and ensured a high degree of inter-coder reliability (Miles & Huberman, 1994). Our thinking constantly interplayed between data collection and analysis, based on how well the data fitted existing, modified or emerging understanding and its relevance to the observed phenomenon.

We used axial coding to focus on one category at a time in order to consider the relationships between core concepts. Codes emerged from both the conceptual review and the interview process, and were subsequently revised during the coding process. The coding process included contextual

codes such as firm size, employees, and relationship-specific codes such as information sharing, joint working, building of new joint activities, efficiencies, and management innovation phases and activities. The coding process informed the structure of the findings and discussion sections. We identified the multi-level and issue-organized analytical chronology as the most suitable way to display the data and start to uncover key structures and processes (Pettigrew, 1990).

4. Findings

4.1 Case background

The UK water industry was privatized in 1989 and broken up into 21 water (and sewerage) companies operating in specific geographical regions (Caves, 2009). The main regulatory framework is the "Asset Management Plan" (AMP) which is submitted on a 5-year interval to the Water Services Regulation Authority (Ofwat) by each water company. Each AMP determines how water and sewage rates are set and identifies the levels of investment required to maintain service levels. Ofwat is responsible for negotiating some pricing structures and each individual company is accountable for its pricing and investment strategy over the AMP period. In this study, the regulatory regime is considered part of the context within which management innovation developments occur (Ofwat, 2015).

The contractor in our study is a large global consultancy providing knowledge-intensive services in engineering, such as designing, monitoring, and delivering large-scale infrastructure projects and associated services. At the time, the water division (about 150 employees) of the firm had a global reputation, providing a range of tailor-made services such as asset management planning and strategic business services, river engineering, flood defense, and land drainage, sewerage, and waste-water treatment. The client (a water company) was established in 1989 and had about 2,000 employees when carried out the research. The company provided clean and waste water

treatments for nearly five million people and more than 130,000 businesses. The firm's AMP 4 period set out a program investment of around £1.4bn.

4.2 Management innovation development phases

The UK water industry formed the environmental context for management innovation and shaped the client-contractor relationship across four AMP periods, each lasting 5 years.

4.2.1 Motivation phase - The AMP 1 period aimed to modernize the UK water industry by adopting standards set out by European directives and Ofwat, implementing a £6bn investment program. As a vertically integrated organization, the water company had previously developed internal competencies to undertake most of the construction, maintenance, and operational activities. At such an early stage of development, outsourcing of the water company's activities occurred gradually as the contractors had to build or acquire the capabilities required to establish a base in this newly emerging market. Project Manager 1 (client) mentioned *"there was some dissatisfaction within the organization with the level of service quality we are providing. Some customers started to complain. […] In all fairness, we just started out and all was quite new to us."* This was a driver for recognizing the need for searching innovative solutions to improve services for customers (Howard & Caldwell, 2011; Smith, Maull, & Ng, 2014). This phase was also needed for the water company to better understand that integrated solutions could not be delivered alone, but with the help of partner.

4.2.2 Motivation and early search phase - In AMP 2, the contractor (a consultancy firm) was one of five companies involved in bidding for stand-alone technical consultancy projects for the water company (the client). These projects included a range of activities such as design options, technical and functional specification, monitoring the work of contractors and feasibility studies. Consultants provided knowledge-intensive business services including the provision of technology assessment and technical advice on all aspects of the water cycle. Project Manager 1 (contractor) pointed out

that *"[...] AMP 2 was fairly traditional [...] and most of the work was tendered for and won competitively and there was a lot of cost associated with that type of model"*. These projects were governed by standardized contracts concerned with repetitive work and neither of the parties engaged much in knowledge sharing or joint working initiatives. However, through the process of market contracting both parties began to *"envision and search for potential gains to be made from a closer organizational integration"* (Project Manager 2, client). It was in AMP2 that the water company was motivated *"to start thinking about and searching more seriously for"* possible innovation developments. This was driven internally by dissatisfied employees and externally through poor performance to other water companies and in the Ofwat water company ranking. The chance to work with a number of external organizations helped the water company to hone their processes in governing inter-organizational relationships and to accumulate process knowledge.

4.2.3 Continuous search and adaptation phase - In AMP 3, the client searched for and experimented further with different forms of inter-organizational relationships to innovate in order to improve performance. The consultant firm formed a joint venture (JV) with a contractor firm and another consulting firm, a fairly common occurrence in the water market at that time (Europe Economics, 2015). The consultant led the temporary JV and assumed sole responsibility for the main framework agreement with the client. Project Manager 2 (contractor) explained that *"[the client] switched from a traditional use of consultants to setting up capital solution partners"*. The water firm aimed to bring back engineering skills in-house and the consultant firm (and its JV partners) provided advice on a program level, rather than focusing exclusively on providing single components. Project Manager 1 (client) described some of the advantages of setting up a JV: *"[...] we discovered that the speed of being able to take a proposal and transfer it into the design-and-construct world would be much higher [and] if we could give the partner much more visibility of the program up front, then it would give them much better mobilization and an ability to have synergies [and] have the right resources available at the right time"*. The client-consultant relationship

evolved during AMP 3 into what can be described as a setting for recurrent contracts used to help the JV align its activities more closely with the client's specifications and requirements. As a Commercial Leader (contractor), a closer and more collaborative relationship was forged with the client: *"[…] we had a strong appreciation of the client and there were quite a number of meetings to jointly discuss the program of solution provision".* As the Capital Solution Manager (client) also explained: *"[...] it is not only about managing the projects, but also to understand the client point of view when talking and building relationships".*

4.2.4 Implementation and validation phase - During AMP 4, the client and contractor organizations established the importance and value of the management innovation. The contractor achieved a close degree of cooperation with the client, acting as the single technical consultant on its framework program for 25 large, strategic projects each worth over £4 million. In addition to these large scheme projects, both worked together to deliver 45 small projects. Director 1 (contractor) explained the transition from AMP 3 to AMP 4: "*In AMP 3 we were part of a joint venture and we were more involved in very much downstream project delivery really. Moving towards AMP4, we have got a lot closer to the client. We are starting to look at program wide issues rather than looking at it as a scheme-by-scheme basis. We have started to engage with the client to best deliver that program worth £250 million."* A manager from the water company describes the role of the consultant as *"[...] to challenge existing product/service delivery in previous AMPs [and] to attempt to be innovative in terms of delivering something different to add value."* Both companies realized that it is during AMP 4 that innovative approaches add value to their businesses and wider society. It was realized that with the help of IPTs (as a management innovation) the delivery of integrated solutions was possible. IPT fostered a more collaboration focused relationship between both partnering firms.

4.3 New organizational structure: Integrated project teams

During AMP 4, the implementation and validation phase, the client and contractor organizations

established co-located, integrated project teams as a new organizational structure. Individuals from the client or contractor organization were selected to participate in the IPTs because they had the complementary skills, experience and seniority required to work in pairs with their counterpart in the contractor or client organization. For example, the water company introduced a new role – the "Project Solutions Manager" – who was responsible for working closely with his or her counterpart from the consultant firm (Figure 1). The following quote emphasizes the degree of integration and blurring of formal organizational boundaries between organizations in each IPT: *"[...] shirts off and all work together. Over time it sometimes became difficult to say who is from [the water firm] and who is employed in [the consultant firm]"* (Director 2, contractor). This set-up helped to develop and implement integrated solutions for the water company's customers. Neither firm alone was able to deliver the required solutions, but through the use of IPT (which came about as a management innovation), the inter-organizational relationship was able to deliver the required outcomes.

<Please insert Figure 1 about here>

The Program Manager (client) illustrated the benefits of working in co-located shared offices: *"[…] collaboration enables quick decisions, quick involvement in projects [to deliver integrated solutions], and a sharing and an understanding of what each other's strategic plans are."* Co-locating project teams provided the flexibility required to achieve relationship objectives as illustrated in the following quote *"…people in the various projects from both organizations desk hop between locations […] the [water company] director spends quite some time down here at the [consultant] office"* (Senior Consultant, contractor). The Commercial Leader (contractor) explained the benefits of establishing strong inter-personal relationships: *"[...] you start to build a lot more mutual respect, and maybe you let down some of the barriers. You get to know people personally, and that helps when you are up against bigger challenges."* Director 2 in the contractor organization emphasizes how the close working relationship forged during AMP4 differed markedly from the transactional

approach used in the past: *"[...] [both firms] have had a couple of joint offsite events to plan what we are developing together [e.g. integrated solutions] and to get to know the counterpart you are working with. And we would never have had these sorts of discussions we are having now, five years ago when we were preparing for AMP 4. We [contractor] thought we knew what [the client's] drivers were. Now we actually know and learn while working together in teams."*

Members working collaboratively in ITPs achieved improvements in performance because they were quick to identify and resolve problems *"[...] without sending emails, just talking to people. But again it is a collaborative approach in managing risks, and we do that jointly"* (Project Manager, water company). Close proximity and regular communication helped to build trust, informal interaction and close inter-personal relationships amongst members of the teams as a manager from the consultant firm explained: *"[...] I think we need co-located teams [...] because what happens when the pressure comes on, you test relationships and communication and under stress I think communication links break down. It is so much easier to have a conversation when you can just walk to somebody when you need them and talk about it over a cup of coffee [...] if you are in separate locations, you have to arrange a meeting […]".* IPTs also had an impact on the reporting structure. *"While in traditionally projects responsibilities of information exchange would mainly be assumed by the project manager and the solution manager of each firm, in integrated project teams, people within the team communicate directly with each other"* (AMP Delivery Strategy Manager, client).

The contribution of IPTs as a management innovation new to the water company and industry was considered as value that leads to customer satisfaction and service quality improvement. These were publicly visible as the water company scored highly on the Operational Performance Assessment (OPA) published by Ofwat. Project Manager 2 (client) explained: *"[...] every year water companies' scores are made public and companies want to achieve the best they can. Performance is continually being measured and monitored and put into the public eye."* Director 3 (contractor) confirmed that

integrated project teams *"[...] brought about value that we think substantially helped the AMP 4 program and to increase the operational performance assessment score, hence customer satisfaction and service quality."*

In AMP 4, the client employed the consultant to offer strategic advice, coordinate a network of contractors and co-develop new technology. During this period, the consultant encouraged the client to launch several new technological ventures and participated in a number of the client's technical R&D projects. The consultant assumed the role of technology broker when it encouraged the water company to collaborate with several UK universities in various projects such as energy, sustainability, and master-planning found in other industries that could be transferred to the water industry. Both companies worked jointly on strategic renewable energy projects, such as wind farms or creating energy from food waste. The Head of Regulations (contractor) mentioned that the firm *"[...] did a lot of work looking at combined heat and power during AMP 4, and that formed the basis of our track record to get also work with other water companies."*

Several challenges had to be overcome to implement IPT as a management innovation. The Project Solutions Manager (client) identified some of the challenges associated with co-location: *"[...] this was a very new experience, and probably some of our people are too close to our partner organization really. I think over time the relationships have got a bit too comfortable and too familiar."* A Senior Consultant (contractor) outlined a few difficulties in setting up integrated project teams: *"[…] expectations were that it would be relatively easy arranging for co-located teams. I think trying to get the various parties together has not been as smooth as it could have been [...] there were some different agendas in place that needed to be aligned [...] and it took a while to sort it out."* This statement is supported by Project Manager 1 (client), outlining initial problems in developing close relationships. *"We were trying to get away from the 'us and them' relationship. We wanted integrated teams. Individually, people were wary of that. [...] People were moving away from a tradition where they felt comfortable as it was a new way of working. Maybe some people felt a little bit threatened that their*

technical skills were being overlooked in favor of an outside consultancy." Table 1 summarizes key observations across management innovation phases.

<Please insert Table 1 about here>

5. Discussion

5.1 Theoretical implications

In this study, we theoretically discuss and empirically illustrate how the shift to integrated solutions in CoPs (Davies et al., 2006; Kowalkowski et al., 2015) requires a complementary management innovation. Working closely together, buyer and supplier organizations had to develop and implement a new organizational structure – the IPT.

With the resurgence in work on complex innovation systems (Dougherty, 2017; Foss & Saebi, 2016), there is an increasing emphasis on the integral nature of CoPS to (re)combine knowledge across ecologies of organizations that generates new opportunities to co-innovate (Tell et al., 2016). We offer one of the first process studies to unpack in detail the process of how a management innovation is developed and implemented in an inter-organizational relationship in a CoPS setting. Prior studies offer few insights into the dynamic process of the emergence of a close cooperative relationship between a buyer and supplier working together to co-innovate in CoPS.

We position three distinct, yet interrelated, contributions. First, the analysis shows that both organizations experimented with various organizational structures over time, leading up to the development and implementation of a management innovation, which was new to the firm and industry. The process can be characterized by four distinct, yet inter-related, phases. The motivation phase is characterized by a single company performing a range of activities in-house and outsourcing only some activities. This phase is vital to bring out facilitating factors and precipitating circumstances to motivate organizations to think about co-innovation. This is followed by the search

phase in which organizations experiment with outsourcing more activities and new forms of contracting relationships. This phase is crucial to start developing initial relationships with partnering organizations and beginning to experiment with different organizational structures. This phase further motivates the development of co-innovation and thus a phase of adaptation.

Our results stress that in order to move from the search to the adaptation phase for a management innovation in CoPS, both partnering organizations needed to build up a working relationship. This is vital in order to foster the development of trust and share information across organizational boundaries (Van der Valk, 2008). Developing a close relationship between both organizations helps to create an understand of each other's roles and responsibilities, uncover organization's specific capabilities, and entrust organizations to invest time and efforts to experiment with possible management innovations (trial-and-error). In order to adopt a new organizational structure, the final implementation and validation phase of the management innovation process is characterized by a close-knitted relationship between two organizations allowing for co-innovation in organizational structures to take place. Our findings from a CoPS setting show that co-innovation is only possible when both organizations worked in a close relationship, are involved in strategic activities and decision-making not solely aimed at an operational level of interaction. This secures and supports the accumulation of valuable information and insights not only within an organization, but also across organizational boundaries (Bettencourt et al., 2002; Bossink, 2002). The contributions of both organizations with their different capabilities and diverse knowledge provides the basis for the management innovation process. This demonstrates how organizations co-innovate with organizational structures to generate and implement a management innovation (Lee et al., 2012; Romero & Molina, 2011).

Second, our study shows the development of IPT as a management innovation in a dyadic relationship setting was supported by both internal and external change agents. These findings

extend prior studies by illustrating that both agents jointly lending credibility to the management innovation process (Hoang & Rothaermel, 2009; Volberda et al., 2014). We empirically confirm that external change agents are vital in bringing new knowledge and a different perspective into the focal organization, which helps in later efforts of implementing a new management innovation. As our study illustrates, experimenting with different organizational structures forges a closer inter-organizational relationship and helps realizing the management innovation process. Our results stress that close relationships with the external change agent have to be established to integrate different knowledge bases and realize the full management innovation process across the four phases. As we showed, the management process involves a dynamics of different organizational structures to build trust between the focal firm and external knowledge sources (McEvily & Zaheer, 1999).

Third, this study also contributes to extant literature on integrated project team (IPT) structures. IPT represents a distinct form of organizing, going beyond traditional arms-length relationships with knowledge exchange, but also offers a "laboratory" where further innovation is initiated (Miles, 2008). Findings show that IPT is based on four essential characteristics: (i) cross-functional integration; (ii) co-location; (iii) relational contracting; and (iv) strategic, program-level activities. Organizations establish co-located and integrated project teams consisting of employees from both organizations with complementary skills and knowledge. Specialized knowledge and expertise found in client and contractor organizations is brought together in a cross-functional team with the authority to lead and execute projects and drive integrated solutions delivery. For example, co-location facilitated easy, informal, or even serendipitous interactions. Such an organizational structure helps employees from both partnering organizations to share information and solve problems in a timely and relative low cost manner (Kulangara, Jackson, & Prater, 2016).

The dyadic relationship emphasizes the importance of sharing information in a more open, consultative, and informal way (Kim, Choi & Skilton, 2015). Trust required for effective relational contracting is fostered by these close relationships developed among employees from partnering organizations, achieved by co-locating offices to share a common space, working closely in teams on a regular basis, and socializing together. IPT is an organizational structure best suited to provide integrated solutions in a CoPS setting (Davies, 2003; Cova & Salle, 2007).

The new dyadic organizational structure is characterized by relational contracting, including social elements such as norms and expectations in order to facilitate the exchange between two parties "to the process of projecting exchange into the future" (Macneil, 1980: 4). The relational approach emphasizes that trust in inter-organizational relationships has be developed to achieve a mutually successful outcome (Kim et al., 2015) and promote goodwill and positive behaviors among the parties involved (Mayer, Davis, & Schoorman, 1995). In contrast to the "swift trust" found in project-based industries such as film and advertising (Grabher, 2002), the partnering organizations in CoPS need to build trust over an extended period of time required to share knowledge, communicate frequently, and interact informal when solving problems and responding rapidly unanticipated events (Zaheer, McEvily, & Perrone, 1998).

The shift to a stronger, relational approach occurs when partnering organizations move from stand-alone projects to larger programs of interrelated projects. This move enforces the development of common goals and complementary capabilities which builds additional collaboration. It also results in ongoing interactions between organizations and frequent information exchange, hence providing organizations with opportunities to strengthen strategic relationships and gather customer-specific knowledge (Kulangara et al., 2016; Petri & Jacob, 2016).

In summary, the evolving dyadic inter-organizational relationship is the context for the joint development of a management innovation (Lacoste, 2016). We offer a deeper understanding of this process of two organizations jointly developing a management innovation in a CoPS setting.

5.2 Managerial implications

The study has implications for how management innovation is developed in CoPS. Managers should encourage experimentation with innovative ways to manage relationships with their contractors. Joint activities between internal and external change agents may help the management innovation development process and realize new performance improvements. We also learn from the case that such a process may take time. Yet, as the new organizational structure of an integrated project team developed, it was able to improve the integration of specialized knowledge and expertise, supporting the delivery of integrated solutions. IPTs are used by cross-functional teams to develop innovative solutions for customers and increase performance over time. However, organizations pursuing management innovation should consider the time and cost efforts needed to realize the development process and overcome the challenges associated with the motivation (why to engage with management innovations in the first instance), search and adaptation ('trial and error), implementation (overcoming resistance), and validation (need for internal and external legitimization) phases of the management innovation.

5.3 Limitations and directions for future research

This study contributes to our understanding of the adoption and dynamics of the management innovation process in CoPS. However, we acknowledge the study's limitations, some of which serve as stimulus for future work. The aim was to add to the theoretical and empirical understanding of

management innovation by two organizations in CoPS. The UK water industry offers an opportunity to theorize about the origin and process of development of a management innovation in industrial relationships. The dynamics of management innovation would benefit from further research in other CoPS settings but also in other regulated markets such as the energy or highways sectors and non-regulated contexts. While this study focused on the inter-organizational relationship over time, future research could also explore the wider network of relationships and its impact on the management innovation process. Further research is needed to explore the nature and the interactions of the phases for new-to-the-firm management innovations uncovered in this study.

6. Conclusions

We studied a management innovation originating over time in CoPS. The paper examined how a client and contractor experimented with various organizational structures to develop a new-to-the-firm management innovation. We demonstrated that the dynamics of developing and implementing a management innovation over time is driven by increasingly closer structures of cooperation amongst both partnering organizations. IPT, as the emerging management innovation, was vital to support the shift to services in offering integrated solutions. IPT helped to forge collaboration and co-innovation focused inter-organizational relationships which are vital in CoPS.

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